

MAY 29 2007

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (currently amended): A computer implemented method for numeric simulation of an electric circuit influenced by noise, comprising ~~for generating at least one sequence of random numbers of 1/f noise by a computer system, which~~ comprises the steps of:

numerically simulating the electric circuit using a model including input channels, noise input channels and output channels, the behavior of the input channels and of the output channels being described by a system of differential equations or a by a system of differential algebraic equations;

in the numerical simulation step, calculating an output vector for an input vector present on the input channels and a noise vector y of 1/f distributed random numbers present on the noise input channel, wherein generation of the noise vector y includes the steps of:

determining a desired spectral value β ;

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determining a number of the random numbers of the $1/f$ noise to be generated;

determining an intensity constant $const$;

setting a starting value for a running variable n ;

performing a loop-type repetition until a desired number of elements $y(n)$ of a vector y of length n is calculated from $1/f$ -distributed random numbers, by the steps of:

increasing a current value of the running variable n by 1;

setting a simulation time step $[t_{n-1}; t_n]$;

determining elements \underline{c}_{ij} of a covariance matrix \underline{C} of dimension $(n \times n)$ according to:

$$\underline{c}_{ij} := const \cdot \left(-|t_j - t_i|^{\beta+1} + |t_{j-1} - t_i|^{\beta+1} + |t_j - t_{i-1}|^{\beta+1} - |t_{j-1} - t_{i-1}|^{\beta+1} \right) \\ i, j = 1, \dots, n$$

determining an inverted covariance matrix \underline{C}^{-1} by inverting the covariance matrix \underline{C} ;

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determining a variable σ in accordance with

$$\sigma = \text{sqrt}(1 / e(n,n)),$$

where sqrt denotes a square root function, and $e(n,n)$ denotes an element of the inverted covariance matrix \underline{C}^{-1} indexed by (n,n) ;

determining a $(0,1)$ -normally distributed random number which forms an n th component of a vector \underline{x} of length n ;

forming a variable μ from first $(n-1)$ components of an n th row of the inverted covariance matrix \underline{C}^{-1} and $(n-1)$ elements of the vector \underline{y} calculated for a preceding $(n-1)$ simulation time step, according to:

$$\mu = - \frac{y_{(n-1)}^T \cdot \underline{C}_{\cdot,n}^{-1}}{\underline{C}_{n,n}^{-1}}$$

where $y_{(n-1)}$ denotes first $(n-1)$ elements of the vector \underline{y} , $\underline{C}_{\cdot,n}^{-1}$ denotes the first $(n-1)$ components of the n th row of the inverted covariance matrix \underline{C}^{-1} , and $\underline{C}_{n,n}^{-1}$ denotes a component of the inverted covariance matrix \underline{C}^{-1} indexed by (n,n) ; and

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calculating an element $y(n)$ of the vector y of
length n from the $1/f$ -distributed random numbers,
according to:

$$y(n) = x(n) * \sigma + \mu;$$

~~storing and outputting the at least one sequence of~~
random numbers of $1/f$ noise.

Claim 2 (currently amended): A computer implemented method
for numeric simulation of an electric circuit influenced by
noise, comprising ~~for generating at least one sequence of~~
~~random numbers of $1/f$ noise by a computer system, which~~
~~comprises the steps of:~~

numerically simulating the electric circuit using a model
including input channels, noise input channels and output
channels, the behavior of the input channels and of the output
channels being described by a system of differential equations
or a by a system of differential algebraic equations;

in the numerical simulation step, calculating an output vector
for an input vector present on the input channels and a noise
vector y of $1/f$ distributed random numbers present on the

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noise input channel, wherein generation of the noise vector y
includes the steps of:

determining a desired spectral value β ;

determining a number of the random numbers of the $1/f$
noise to be generated;

determining an intensity constant $const$;

setting a starting value for a running variable n ;

calculating q sequences of the random numbers of the $1/f$
noise simultaneously, by performing loop-type repetitions
until a desired number of elements $y_{k,n}$ of a vector y of
length n is calculated from $1/f$ -distributed random
numbers, by the steps of:

increasing a current value of the running variable n
by 1;

setting a simulation time step $[t_{n-1}; t_n]$;

determining elements \underline{C}_{ij} of a covariance matrix \underline{C} of
dimension $(n \times n)$ according to:

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$$\underline{\underline{C}}_{ij} := \text{const} \cdot \left(-|t_j - t_i|^{\beta+1} + |t_{j-1} - t_i|^{\beta+1} + |t_j - t_{i-1}|^{\beta+1} - |t_{j-1} - t_{i-1}|^{\beta+1} \right) \\ i, j = 1, \dots, n$$

determining an inverted covariance matrix $\underline{\underline{C}}^{-1}$ by

inverting the covariance matrix $\underline{\underline{C}}$;

determining a variable σ in accordance with

$$\sigma = \text{sqrt}(1 / e(n, n)),$$

where sqrt denotes a square root function, and

$e(n, n)$ denotes an element of the inverted covariance matrix $\underline{\underline{C}}^{-1}$ indexed by (n, n) ;

determining a quantity q of $(0,1)$ -normally

distributed random numbers $x_{k,n}$ which form a

respective last component of vectors \underline{x}_k of length n ,

where $k = 1, \dots, q$,

forming q variables μ_k according to:

$$\mu_k := - \frac{y_{(n-1),k}^T \cdot \underline{\underline{C}}_{*,n}^{-1}}{\underline{\underline{C}}_{n,n}^{-1}}$$

where $y_{(n-1),k}$ denotes first $(n-1)$ components of the

vectors \underline{y}_k that were calculated for a preceding

simulation time step, $\underline{\underline{C}}_{*,n}^{-1}$ denotes the first $(n-1)$

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components of the n th row of the inverted covariance matrix \underline{C}^{-1} , and $\underline{C}_{n,n}^{-1}$ denotes the element of the inverted covariance matrix \underline{C}^{-1} indexed by (n,n) , where $k = 1, \dots, q$; and

calculating q elements $y_{k,n}$ which form a respective n th component of the vector \underline{y}_k of length n from $1/f$ -distributed random numbers, according to:

$$y_{k,n} = x_{k,n} * \sigma + \mu_k,$$

where $k = 1, \dots, q$;

~~storing~~ and outputting at least one of the q sequences of random numbers of $1/f$ noise.

Claim 3 (original): A method for simulating a technical system subject to $1/f$ noise, which comprises the steps of:

determining random numbers according to claim 1; and

using the random numbers for modeling variables present on input channels of the technical system.

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Claim 4 (original): A method for simulating a technical system subject to $1/f$ noise, which comprises the steps of:

determining random numbers according to claim 2; and

using the random numbers for modeling variables present on input channels of the technical system.

Claim 5 (currently amended): A computer running a computer program, comprising:

computer-executable instructions for carrying out the method according to claim 1 for determining the sequences of random numbers of the $1/f$ noise.

Claim 6 (currently amended): A computer running a computer program, comprising:

computer-executable instructions for carrying out the method according to claim 2 for determining the sequences of random numbers of the $1/f$ noise.

Claim 7 (currently amended): A computer running the instructions stored on a computer-readable data medium having the computer-executable instructions according to claim 5.

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Claim 8 (currently amended): A computer running the instructions stored on a computer-readable data medium having the computer-executable instructions according to claim 6.

Claim 9 (original): A downloading method, which comprises the step of:

downloading the computer program according to claim 5 from an electronic data network onto a computer connected to the electronic data network.

Claim 10 (previously presented): The method according to claim 9, which further comprises using the Internet as the electronic data network.

Claim 11 (original): A downloading method, which comprises the step of:

downloading the computer program according to claim 6 from an electronic data network onto a computer connected to the electronic data network.

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Claim 12 (original): The method according to claim 11, which further comprises using the Internet as the electronic data network.

Claim 13 (previously presented): A computer system, comprising:

processor programmed for executing the method for determining the sequences of random numbers of the 1/f noise according to claim 1.

Claim 14 (previously presented): A computer system, comprising:

processor programmed for executing the method for determining the sequences of random numbers of the 1/f noise according to claim 2.

Claim 15 (previously presented): A computer system, comprising:

processor programmed for executing the method for determining the sequences of random numbers of the 1/f noise according to claim 3.

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Claim 16 (previously presented): A computer system,
comprising:

processor programmed for executing the method for determining
the sequences of random numbers of the 1/f noise according to
claim 4.

Claim 17 (previously presented): A method for simulating a
technical system subject to 1/f noise, which comprises the
steps of:

determining random numbers according to claim 1; and

using the random numbers for fixing variables present on input
channels of the technical system; and

simulating the technical system and outputting the result of
the simulation.

Claim 18 (previously presented): A method for simulating a
technical system subject to 1/f noise, which comprises the
steps of:

determining random numbers according to claim 2; and

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using the random numbers for fixing variables present on input
channels of the technical system; and

simulating the technical system and outputting the result of
the simulation.